

Dear **To Whom It May Concern**,

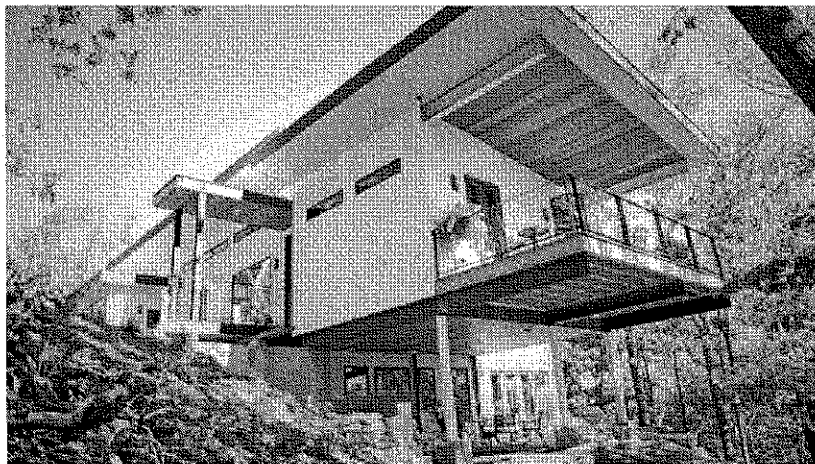
My name is Michael Schmidt, and I am a Business major at the University of Connecticut. Through my studies and interests, I discovered and became immensely interested in the hemp plant. When I was told what it could do, that it can be turned into cars, and house, and fuel, I said this was obviously too good to be true. But as I intrigued further, I learned that everything that I had been told about hemp was true. In fact, after perusing the web, I discovered that my own university had a machine that could convert hemp seeds into efficient bio-diesel fuel. I learned as well, that the industrial legend, Henry Ford, built his first Model-T car using cellulose plastic from hemp and other plant fibers; the car he "Grew from the Soil" was so strong that when they tried to hit it with a pick axe, the axe simply bounce off, leaving no dent behind. These and other stories had a profound effect on my life and changed my view of the world, as well as my future career aspirations. As a child I was appalled at the history of deforestation in many parts of the world, how acres of trees were cut down causing irreparable damage to the neighboring ecosystems and the animals who inhabited them. Yet I was told, silly child that I was, that deforestation is a necessary evil that provided us with the necessary resources to live well and comfortably. For without trees, how would we have houses, and paper, and chairs, and all sorts of other utilities? As a young child I could not rebut this argument from people much older and wiser than I. But then I learned that with hemp, there would no longer have to be a choice between comfort and environmental sustainability. Not only does hemp produce a stronger and longer lasting paper, one acre of hemp can produce as much paper as four acres of tree. This is no secret, in fact in 1916 the US government predicted that by the 1940's all paper would come from hemp, and that no more trees would need to be cut down. As well, in the 1930's hemp was found to be able to produce over 50,000 different products, from plastics, to building materials, to cellophane. Unfortunately in 1937 the Marijuana Tax Act banned the growing of any form of cannabis sativa in the United States, and in a blatant case of mistaken identity, hemp became illegal as well; even though it is impossible to use industrial hemp for recreational purposes. In the recent months, discussion and passing of industrial hemp legislation has been on the rise in the United States, including in our fair state of Connecticut. The proposed hemp bill "HB5780" would open the door for a full-scale commercial hemp market in the state by treating it as any other crop for farming; the bill was passed through the Joint Committee on General Law by a unanimous 18-0 vote on March 12, 2015. HB5780 will likely be received by the state House for a full vote next. The passing of this bill would provide the opportunity for our great state to become involved in the industrial hemp industry, which would be just as economically beneficial, as it would be environmentally. Below I have attached my junior hemp research paper for you to peruse, as well as a brochure I created and distributed over the last year at gatherings and events. I urge you to allow the unlimited potential of this wonderful plant to become unlocked once again, and help pass HB 5780. Thank you so much for taking the time to read my testimonial.

Sincerely,

Michael A. Schmidt, Stamford, CT 06903

Industrial Hemp: Prohibition, Uses, & Future

By Michael Schmidt



INDUSTRIAL HEMP: Prohibition, Uses, & Future

When most people hear the word hemp, a picture of stoner-happy hippies, rolling joints with hemp paper and wearing hemp clothing appears. Yet most people don't know about the thousands of uses of hemp and how hemp can become a solution to some of the world's biggest problems. Hemp is among one of the oldest industries on the planet, going back more than 10,000 years and was for most of that time the largest agricultural crop in the world. So what is hemp? Well, it is by far the most robust, durable, natural soft fiber on the face of this planet (qtd. in Soiferman). The hemp plant is composed of three main parts: the stringy fibers, the woody hurds, and the hemp seeds. Hemp has thousands of uses including fabrics, lighting oil, paper, textiles, plastics, building materials, fuel, fertilizer, and food. A *Popular Mechanics* article from 1938 stated that over 25,000 different products could be made from hemp in oil, seed, or fiber form. The article stated "Hemp is the standard fiber of the world. It has great tensile strength and durability. It is used to produce more than 5,000 textile products, ranging from rope to fine laces, and the woody "hurds" remaining after the fiber has been removed contain more than seventy-seven per cent cellulose, and can be used to produce more than 25,000 products, ranging from dynamite to Cellophane ("New Billion" 1)." Even Henry Ford, of Ford Motor Company, spent more than a decade researching hemp and in 1941 built his Model-T car with cellulose fibers derived from hemp, sisal, and wheat straw. The plastic was lighter than steel, yet could withstand ten times the impact without denting, and was designed to run off hemp fuel. Along with all of this, hemp is highly resistant to most insects and diseases, eliminating the need for most pesticides and herbicides, and can be grown on a wide variety of soil types.

After hearing this, it should shock a person to know that hemp has been illegal to grow in US since 1937 and only became legal to grow for research purpose on February 5th, 2014. Hemp

will soon be cultivated in 10 states under a federal farm bill passed by the U.S. Senate and who knows what changes it will bring. With US support, the hemp industry will begin to see a boost in production in four key hemp categories: paper, textiles/fabrics, plastics/building materials, and biofuel. With the implementation of hemp in these areas we can completely eradicate deforestation, energy dependence, and many of the world's problems.

The very first thing that appears odd when looking at the history of hemp is how very much legal it once was. In fact not only was it legal, it just so happened to be one of the largest agricultural crops in the world, including in the US. It's even more peculiar that the very first marijuana law to exist in the US forced farmers to grow hemp, and later hemp could even be used to pay taxes. Benjamin Franklin used hemp to open one of America's first paper mills and the first two drafts of the Declaration of Independence were written on hemp paper. Up until 1883 and thousands of years before, the majority of fabrics, lighting oil, medicines, paper and fiber came from hemp (qtd. in Soiferman). It is also important to note that although hemp is the sister plant to marijuana, hemp cannot get you high. The average amount of THC (the active chemical in marijuana) in recreational marijuana is between 10-20 percent while the THC percent in hemp is .3 of a percent (qtd. in Soiferman).

For the first 162 years of America's history, marijuana was completely legal and hemp was a common crop. But during the 1930s, the U.S. government and the media began spreading outrageous lies about marijuana, which led to its prohibition. Movies and videos such as *Marijuana: The devil's weed with roots in hell*, *Marijuana makes fiends of boys in 30 days*, and the infamous film *Reefer Madness* convinced the American people of the addiction potential and violence inducing nature of marijuana. It's comical to know that thirty years after the

government and media claimed that marijuana made people hysterical and violent, they changed their tone in the 1960's stating that marijuana made people lazy and into pacifists (Smith-Heisters 159). As a result of government and media propaganda, cannabis was banned in the USA under the Marijuana Tax Act of 1937. In a blatant case of mistaken identity, industrial hemp was banned along with it.

But does hemp deserve to be lumped in with the recreational drug marijuana and how has the world been affected by hemp prohibition? There is immense evidence to believe that hemp illegalization was due to lobbying efforts from major corporate interests who feared the effect of industrial hemp on their industry and profit. William Randolph Hearst and the Hearst Paper Manufacturing Division of Kimberly Clark owned vast acreages of timberlands and the Hearst Company supplied most paper products at the time. Patty Hearst's grandfather stood to lose billions because hemp was poised to replace wood as a cheap and high yielding source of cellulose and paper. In 1937, DuPont patented the processes to make plastics from oil and coal and DuPont's Annual Report urged stockholders to invest in its new petrochemical division. Synthetics such as plastics, cellophane, celluloid, methanol, nylon, rayon, and Dacron could now be made from oil. Natural hemp industrialization would have ruined over 80% of DuPont's business (Smith-Heisters 157).

Whether or not this was the sole or primary cause of hemp prohibition does not matter, only that there was no just reason to make hemp illegal and it set back the USA in both environmental and economic ways. The current mainstream products or the alternatives products to the hemp-based ones are not only not as effective, but also cause dramatically more environmental harm; this is because hemp is an easy to grow crop that requires minimal pesticides/herbicides and use of petroleum-based machinery. "Industrial hemp experts consider it

a low-input, low-impact crop. Inputs required for cultivation of any crop are an important environmental consideration because of the pollution created in their production and left behind from their use. In the case of chemical fertilizers, herbicides, and other pesticides, life cycle impacts result from their manufacture as well as their shipment, storage, and delivery in the field (Smith-Heisters 159).” The economic damages of hemp prohibition are plain to see, after learning the uses of hemp and comparing them to our current alternatives.

Hemp is a primary substance for papermaking and has been used as such for 2,000 years. In the 20th century, wood pulp came to replace hemp and other long fibres, and this has been an environmental disaster. While hemp will always have its place in the joint paper market, writing paper may continue to be made from trees until we run out and are forced to use other materials. But, there must have been a reason that people from all over the world used hemp for paper for such a long time. The reason for this is that hemp fibres are long, as opposed to wood, and thus make for a stronger sheet. The more interlocked the fibres are, the stronger the paper. Not only does hemp have this advantage over wood, but over many other fibres in the vegetable world (Gibson2 117). Even better than that, one acre of hemp, grown in a single season, yields as much paper as up to 4 acres of trees, and trees take years to grow. As well, hemp paper is stronger, acid free, has a longer shelf life, and can be recycled up to ten times (qtd. in Soiferman).

Paper is produced by pressing together moist fibers, usually cellulose pulp derived from wood, rags or grasses, and then drying them into flexible sheets. Much of the hemp plant is cellulose, found mostly in the outer bark of the stem, which is about 75% cellulose, while the core is about half that or more. Trees are made up of only 30% cellulose and the other 70% of the tree must be removed using toxic chemicals, until the cellulose can be formed into paper

(Gibson1 77). It is important to note how useful cellulose is in general,” What do we do with cellulose that makes it such a commodity? We wear it; read on it; live in it; work on it; sail with it; fish with it, and burn it for fuel (Gibson1 76-77).” Hemp makes paper stronger and lasts centuries longer than wood paper and hemp paper does not yellow, crack, or otherwise deteriorate like tree paper. The acids which are needed for wood paper eventually eat away at the pulp and cause it to turn yellow and fall apart. Hemp paper also does not require any bleaching, and so does not poison the water with dioxins or chlorine like tree paper mills do. The chemicals involved in making hemp paper are much less toxic, in fact, both paper made from hemp hurd, and from the long baste fiber can be made without any chemicals at all, but it takes longer to separate the fiber from the lignin (Gibson2 118). Making paper from hemp could also eliminate erosion due to logging, reduce topsoil loss, and water pollution caused by soil runoff.

The most popular and one of its most versatile uses of hemp is in fabrics and textiles. Hemp can be made into fish nets, bow strings, canvas, strong rope, sails, overalls, damask tablecloths, fine linen garments, towels, bed linens, and hundreds of types of clothing. Of all the known uses clothing is by far the oldest and over time the use of hemp for clothing has been a constant thread in man’s history. Catherine de Medici wore hemp and the Italians for centuries produced it as one of their best exports. It is believed that it was spun as fine as silk, not just the coarse fiber that we know it as from its use as ropes. This commerce continued into the twentieth century and has been in that same country revived by designer Giorgio Armani, who has acquired over two-thousand acres for hemp cultivation. (Gibson1 78). One major fallacy in hemp prohibition is that importing hemp is not illegal, only cultivation on US soil. As hemp was for the longest time not a legal crop in the US, clothing manufacturers would have to buy Chinese

hemp, paying a premium for what could have been sold for a lot less and grown on US soil, providing jobs for Americans. There is a sad note of irony in forcing an American to buy hemp from abroad, knowing that hemp was grown extensively in the US, with note of it even being grown there before Columbus (Gibson 178).

The need for hemp based clothing is seen to be even more urgent when comparing it to cotton. Environmentally, hemp is a safer crop to grow than cotton. Cotton is a soil-damaging crop and needs a great deal of fertilizers, herbicides and pesticides. Cotton crops in the USA occupy 1% of the country's farmland but use 50% of all pesticides. "The pesticides used on cotton, whether in the U.S. or overseas, are some of the most hazardous available today," says Doug Murray, Ph.D., a professor of sociology at Colorado State University who has studied pesticide use on cotton overseas (qtd. in Soiferman). As well one acre of hemp will produce as much as 2-3 acres of cotton, and hemp is 4 times warmer than cotton, 4 times more water absorbent, has 3 times the tensile strength of cotton. It is also many times more durable and is flame retardant (qtd. in Soiferman).

Of all the possible transitions of products to hemp, the switch of fabrics/clothing from cotton to hemp is the most likely to occur and on a massive scale. Many high fashion clothing manufacturers have produced clothes and footwear made with hemp. Some of these include Nike, Converse, Armani, Patagonia, Polo Ralph Lauren, and Oscar de la Renta. HT Naturals (Canada's largest hemp t-shirt supplier) asserts that selecting their hemp/cotton blended t-shirt over an all-cotton t-shirt saved the environment 744 gallons of water. This company has recently partnered with Canada's National Research Council to create "Crailar" an enzyme that will make hemp fibres as soft as cotton (qtd. in Soiferman). Besides pure hemp clothes, hemp is blended with cotton, silk, tencel, bamboo, spandex and other fibres to make a wide variety of fabrics with

various attractive properties. Of all of hemp's possible uses, hemp clothing seems to be the most likely option to occur on a global scale; hopefully after mass production of 100% hemp clothing, the people of the world will see the immense difference hemp can make and will be willing to open up the discussion of applying hemp to other facets of industry.

There are many people who are aware that hemp has the ability to make paper and textiles, but what about an entire house? Houses built from hemp have been found to use less energy, create less waste, and take less fuel to heat than conventionally constructed homes. Hemp is categorized as a bast fiber crop and has a stem consisting of an outer skin containing long, strong fibers and a hollow wood-like core or pith. Processing the stems results in two materials: hurds and fibers, both of which have properties that make them extremely useful in building construction. A variety of wood-like products, such as fiberboard, roofing tiles, wallboard, paneling, insulation and bricks, can be made from the compressed hurds.

The foundation of a building can as well be made out of hemp. A hemp plywood frame is filled with hemp hurds combined with lime, sand, plaster, some cement and enough water to dampen, and then left to set for a day and to harden for a week. A sixth century hemp-reinforced bridge in France is testimony to the stone-like strength and durability of this material, which has come to be known as "hemcrete". "Hemcrete foundation walls are up to seven times stronger than those made of concrete, half as light and three times as elastic. This superior strength and flexibility means that hemp foundations are resistant to stress-induced cracking and breaking, even in earthquake-prone areas. The building material also is self-insulating; resistant to rotting, rodents and insects; and fire proof, waterproof and weather resistant (Priesnitz 14)." Pipes can also be made out of hemcrete, and they too have greater flexibility and greater elasticity than

those made from conventional materials, and they are resistant to cracking. Washington State University has produced hemp fiberboard, which is lighter, twice as strong, and three times as elastic as wood fiberboard, plus it has sound proofing and pressure isolative characteristics absent from wood fiberboard (Priesnitz 17).

Irish builder Henry O'D Thompson of The OldBuilders Company is a fan of using hemp and lime on old stone walls for insulation, condensation, sound muting and breathability. A restoration and conservation specialist who once lived in Canada, he says that lining walls with the hemp/lime mixture makes for a healthy house that doesn't grow toxic mold. With over 120 different projects in the last nine years having used the material in Ireland and over 250 in 16 years in France, this revolutionary but simple material is now receiving more recognition. Thus the number of commercially available hemp building products is also increasing. "A number of companies are using hemp in insulation products, due to its high thermal resistance, ability to absorb and release moisture, and lack of mold growth, dust and other pollutants. Thermo-Hemp, from Ecological Building Systems in Ireland, is available in both mats and rolls (Priesnitz 17)." Even hemp-based paints have been created and have proved their superior coating and durability characteristics.

Suffolk Housing Society built the first two hemp houses in England, as part of an 18-unit social housing development, then studied their performance compared to the regularly constructed buildings. The Building Research Establishment (BRE) report's principal conclusion was that while the hemp homes have far less impact on the environment, use less energy to build, create less waste, and take less fuel to heat, they cost about 10 percent more to build than brick and block houses (Priesnitz 15). Hempcrete and hemp based products for building have shown to be far superior to any alternative, and yet the current cost of hemp will prevent any mass

marketing of them until the political climates allows for widespread cultivation of hemp. Having been used for centuries around the world, hemp is destined for a come-back in modern housing construction.

It has been assumed that the main source of renewable energy in the future will be biomass obtained from energy crops and waste materials. The advantage of biomass compared to fossil raw materials results from the absorption of CO₂ from the atmosphere by photosynthesis resulting in a limitation of the emission of greenhouse gases. The selection of crops for this will require taking into account the principles of sustainable agriculture, as well as, those of economic prosperity. Therefore, increasing the cultivation of high yielding, low impact crops, such as hemp, will be the main interest of agriculture in the near future.

In a blog post from *The Guardian* about alternative fuels, Giulio Sica explains the qualities that make hemp a good energy source stating, “[Hemp] has been successfully used for many years to create bioethanol and biodiesel, is environmentally friendlier to produce than sugar beet, palm oil, corn or any of the crops mentioned in the report and can grow in practically any temperate to hot climate leaving the ground in better condition than when it was planted.” The plant is efficient, bred to improve quality, yield, stress tolerance, and decreased cost per ton. As well, hemp grows quickly while also requiring less energy and fertilizer, and doesn’t require chemicals after planting. It can even help the farm by breaking the disease cycle of other crops. This use has even gained footing in notable universities such as the University of Connecticut. At the University of Connecticut, researchers found industrial hemp to contain viable qualities for producing biodiesel. Hemp biodiesel produced by graduate students at the school had a 97 percent conversion efficiency. It will be interesting to see the university’s role in this alternative

fuel source, since it owns a patent on a biodiesel reactor system that can make fuel out of various inputs, including hemp.

This idea is also being utilized in other countries including Poland where the straw of hemp grown for seed is composted or used for fiber production, while the shives are used to make briquettes, which are burned. In recent years, the biomass obtained from energy crops and waste materials transformed into briquettes or pellets is traded within Poland and exported. "The observations made thus far show that industrial hemp grown also for this purpose may be economically justified for agriculture and will also provide additional profits. Due to its high economic and biological value and its ability to grow in difficult environmental conditions, it may contribute to an ecological improvement of the environment (Burczyk 38-39)." These improvements should not be ignored for they have great potential to also heal affected or damaged soil. "Hemp grown on soils contaminated by heavy industry can remediate these soils by extracting and accumulating high amounts of heavy metals (cadmium, lead, copper, and mercury) and thus restore the soil's agricultural productivity. Due to its well-developed tap root, hemp transfers the nutrients and water from the deeper to the upper layers of the soil, improving its value as a preceding crop in a rotation (qtd. In Burczyk)." This area of hemp technology, although still small in production and awareness, is very important to keep in mind as we get closer to the dreaded oil peak and begin to look for new solutions to our energy crisis. Currently the US plans to begin extensive hydraulic fracturing campaigns to acquire the natural gas found deep in the earth in the form of shale caverns. These fracking procedures have shown to be incredibly harmful to the surrounding environment and population, with gas seeping into the soil through the manmade fractures and even into neighboring rivers and aqueducts. With a more

serious look into energy crops such as hemp, we can possibly divert interest from this hazardous practice to one that promises efficiency and future environmental safety.

After learning just a few of the numerous uses of hemp it is mentally shocking to see that this crop has yet to be utilized to its full potential in our 21st century society. But there is still hope for change especially since the passing of US Farm Bill which contains an amendment to legalize hemp production for research purposes. Originally introduced by Rep. Polis (D-CO), Rep. Massie (R-KY) and Rep. Blumenauer (D-OR), the amendment allows State Agriculture Departments, colleges and universities to grow hemp, defined as the non-drug oilseed and fiber varieties of *Cannabis*, for academic or agricultural research purposes, but it applies only to states where industrial hemp farming is already legal under state law. This is a huge step towards a sustainable hemp future. With US federal support, there will be more American scientific innovation in hemp as well as a greater chance for a nationwide legalization of hemp cultivation.

A future with hemp will provide the world with the essentials for a good life. Being able to provide people with houses, food, clothing, paper, tools, and fuel all from the same plant will benefit the many third world countries that are predominantly agricultural economies. Deforestation will become a thing of the past with hemp being able to produce paper quicker and more efficiently than wood. Energy dependence will no longer be a national crisis as alternative energies including hemp biofuel replace the crude oil products needed in our current time. All forms of clothing and textiles will be made from hemp from winter coats to fine silk, removing the need for cotton and the multitude of pesticides needed for its production. While houses, cars, and tools made from hemp will be readily available, of unsurpassed quality, and biodegradable when no longer needed. A future with industrial hemp is a bright future, a future full of both

environmental and economic prosperity. Thomas Jefferson once said, "The greatest service that can be rendered to any country is to add a useful plant to its culture"; when it comes to industrial hemp this is decidedly so.

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Hemp Quotes:

- President **Thomas Jefferson** urged about hemp:

"Hemp is of first necessity to the wealth & protection of the country."

- President **John Adams** suggested on hemp:

"We shall, by and by, want a world of hemp more for our own consumption."

- President **George Washington** advised on hemp:

"Make the most you can of the Indian Hemp seed and sow it everywhere."

- Industrialist **Henry Ford** on hemp:

"Why use up the forests which were centuries in the making and the mines which required ages to lay down, if we can get the equivalent of forest and mineral products in the annual growth of the hemp fields?"

HEMP: AN INTRODUCTION

- Hemp is the most robust, durable, long lasting, natural soft fiber on the face of this planet
- It can be made into over 25,000 different products from dynamite to cellophane
- Hemp is one of the world's oldest industries, more than 10,000 years old
- The first marijuana law in the US ordered farmers to grow hemp and the Founding Fathers grew hemp as well
- The Hemp plant grows quickly, in most climates, and does not require pesticides or herbicides
- The first Bibles, maps, charts, Betsy Ross's flag, and the first drafts of the Declaration of Independence were made from hemp
- In 1938, hemp was called a 'Billion Dollar Crop' by *Popular Mechanics*. It was the first time a cash crop had a business potential to exceed a billion dollars
- Hemp is the sister plant to marijuana (in the same species) but it can not get you high. Yet it is still illegal to grow hemp in the US for production purposes

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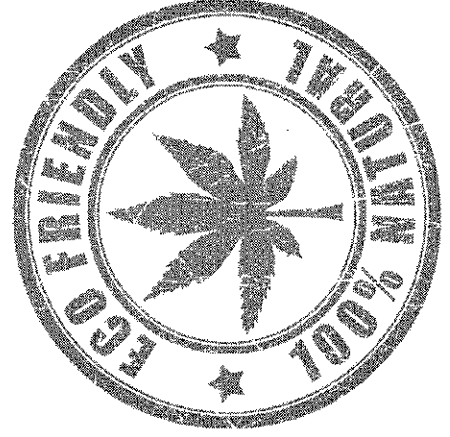
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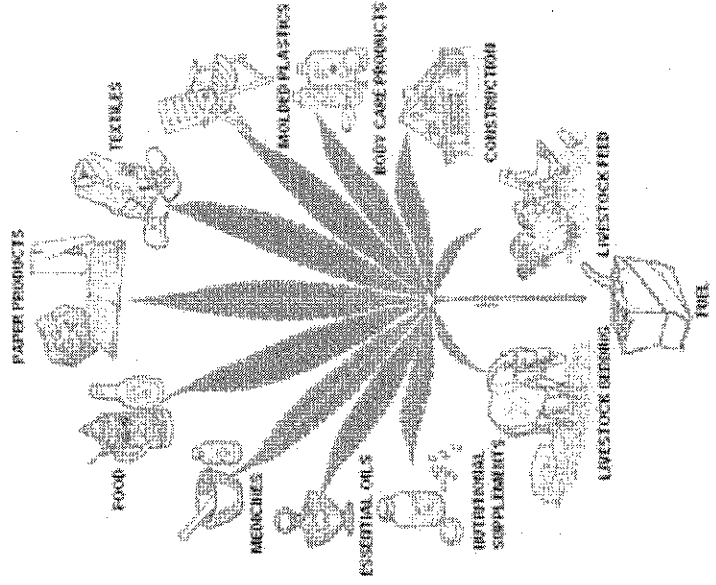
LEGALIZE HEMP **It Can Save Our Planet**

"I don't know if hemp's gonna save the world, but I do know you don't... it's the only thing that can." Jack Herer



Hemp makes more than 50,000 products including Food, Clothing, Shelter & Medicine

THE MANY USES OF INDUSTRIAL HEMP





Paper & Clothing

- 1 acre of hemp will produce as much paper as 4.1 acres of trees (and A LOT less time to grow)
- Hemp paper is stronger, acid free, has a longer shelf life and costs less than half as much to process as tree paper
- Hemp paper can be recycled up to 10 times
- Hemp paper can **END DEFORESTATION**

-1 acre of hemp will produce as much as 2-3 acres of cotton

-Cotton crops occupy 1% of US farmland but use 50% of all pesticides

Hemp is 4 times warmer than cotton, 4 times more water absorbent, has 3 times the tensile strength and is flame retardant

-Hemp is also anti-microbial, anti-mildew, and naturally UV resistant

Plastics/Houses/Cars

-Using the cellulose hurds and strong fibers, hemp can produce all parts of a house including walls, fiberboard, insulation, fiber-glass substitute, cement blocks, concrete, stucco, and mortar

-Hemp Concrete is mildew resistant, termite resistant, fire proof, water proof, and 7 times stronger than regular concrete (not to mention lighter and more elastic)

-Hemp can be processed into plastics that are stronger than regular plastics, cleaner to produce, and biodegradable

-Henry Ford built a car made of hemp and other plants known as the car he "grew from the soil" that was 70% cellulose & 30% resin binder. Hemp is the highest cellulose yielding plant on the planet.

-The car frame was 10x stronger than steel, 1/3 lighter & ran on hemp fuel

FUEL!!!!

-The oil from the pressed hempseed can be turned into biodiesel, or the fermented stalk can be made into ethanol and methanol.

-An experiment done at the University of Connecticut converted hemp into biodiesel at 97% efficiency

-Biodiesel is completely biodegradable and a much cleaner fuel for the air.

-The exhaust emissions of carbon monoxide from bio-diesel are 47% lower than carbon monoxide emissions from diesel

-Hemp Plants absorb 10 times the amount of Carbon Dioxide as trees

